

AD625538

Semi-Annual Report

(Report No. 3)

for the period

1 July 1965 through 31 December 1965

DEVELOPING A SYSTEM OF SOLAR FLARE PREDICTION

ARPA order #215, Amendment #14  
Project Code #RR002-10-01, 1-24

Name of Contractor

The Regents of the University of Colorado  
Boulder, Colorado

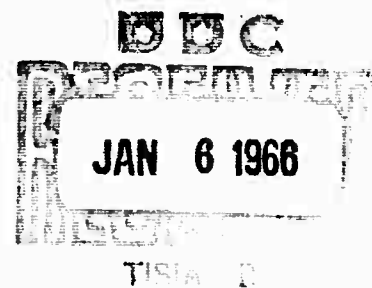
Date of Contract: January 1, 1965

Contract Expiration Date: December 31, 1966

Amount of Contract: \$17,500

Contract Number: Nonr 1147(13)✓

Project Scientist: Donald E. Billings  
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Head, Physics Branch  
Physical Sciences Division  
Office of Naval Research  
Washington, D. C.

Attention: Director, ARPA

Reference: Contract#Nonr 1147(13)  
Semi-Annual Report for the Period  
1 July 1965 through 31 December 1965.

Gentlemen:

Work on the contract was continued by Mr. Lorne Avery under the direction of Dr. Billings.

During the report period we concluded the light-curve study mentioned in Semi-annual report #2, and concluded that it was the bright portion of the H $\alpha$  emission near the core of flares, rather than the extended filaments of flare regions that have curves corresponding to the x-ray emission. Photometric measurements make this conclusion quite indecisive, however.

Next we turned our attention to the phenomenon of the long-period tendency of the same solar longitude to be the source of activity. This phenomenon has been studied rather extensively by Guss, C. Warwick, and Trotter and Billings. We looked into coronal data at high latitudes preceeding the past sunspot cycle to see if this longitude preference could be detected in the coronal emission that has been shown by Bell and Waldmeier to preceed the outbreak of actual sunspot activity by several years. We found some evidence for a preference for the longitudes that were to become active later, but nothing conclusive.

Avery is now turning his attention to the choice of a thesis topic that will have bearing on flare prediction and give promise of leading to some definite conclusion concerning flares. He is considering one of two general fields--the study of flare radiation phenomena, using a Monte Carlo method suggested by Dr. House of the High Altitude Observatory, or the study of the growth of sunspots, using some new hydromagnetic concepts developed by Dr. M. Altschuler, also of the High Altitude Observatory. Both methods seem to offer considerable promise. If Avery chooses the radiation problem, Billings will probably continue to work with Altschuler on the prediction of the growth or decay of sunspots. Since flares seem to be almost inevitable when a condition of large gradient in the sunspot magnetic fields normal to the solar surface exists, the prediction of the course of growth of spots in a group could lead rather directly to effective flare prediction.

Respectfully submitted,

*Donald E. Billings*

Donald E. Billings  
Project Director

DEB:kc

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## DOCUMENT CONTROL DATA - R&amp;D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) University of Colorado Boulder, Colorado		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP None.	
3. REPORT TITLE  Developing a System of Solar Flare Prediction			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Third Semi-Annual Report for Period 1 July 1965 through 31 December 1965			
5. AUTHOR(S) (Last name, first name, initial)  Billings, Donald E.			
6. REPORT DATE 17 December 1965		7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS 0
8a. CONTRACT OR GRANT NO. Nonr 1147(13)		8a. ORIGINATOR'S REPORT NUMBER(S) 3	
b. PROJECT NO. RR002-10-01, 1-24		8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) None	
c.			
d.			
10. AVAILABILITY/LIMITATION NOTICES  None			
11. SUPPLEMENTARY NOTES  None		12. SPONSORING MILITARY ACTIVITY Director, ARPA Physical Sciences Division Office of Naval Research Washington, D. C.	
13. ABSTRACT  We have concluded a rather indecisive study of flare light curves compared to x-ray data, and another looking for very early evidence of a preferred longitude for solar activity. We now turn our attention to basic principles of flare radiation and sunspot growth.			

14.

## KEY WORDS

LINK A

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